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**G5R RAC RHD**

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**JP 070092982 A**

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INT CL$^7$ **G11B 19/02 19/16 31/00**
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(54) Abstract Title
**Digital file reproduction system and method for driving the same**

(57)    A digital file reproduction system and a method for driving the same. The digital file reproduction system comprises a body including a hard disk drive (215) for storing a large number of compressed MP3 files, a drive receiver (210) for accommodating the hard disk drive (215), a body controller (230) for reading a list and data of the music files stored on the hard disk drive through the drive receiver, a signal processor (240) for expanding the music file data read by the body controller (230) and converting the expanded music file data into an analog voltage signal, and a power supply (205) for supplying power to the system. A remote controller (100) includes a display (120) for displaying the music file list read by the body controller (230), a button pad (110) for selecting a specific music file in the music file list displayed on the display (120) and instructing the body controller (230) to output data of the selected music file, and a sub-controller (130) for receiving the music file list read by the body controller (230), displaying it on the display (120), highlighting the specific music file selected by the button pad (110) and outputting a control signal to the body controller (230) in response to the instruction from the button pad (110). An audio generator receives the analog voltage signal from the signal processor, converts it into an audio signal and outputs the converted audio signal externally.
    Embodiments with a CD-rom drive in place of a hard disk drive, and movie files in place of music files are also claimed.
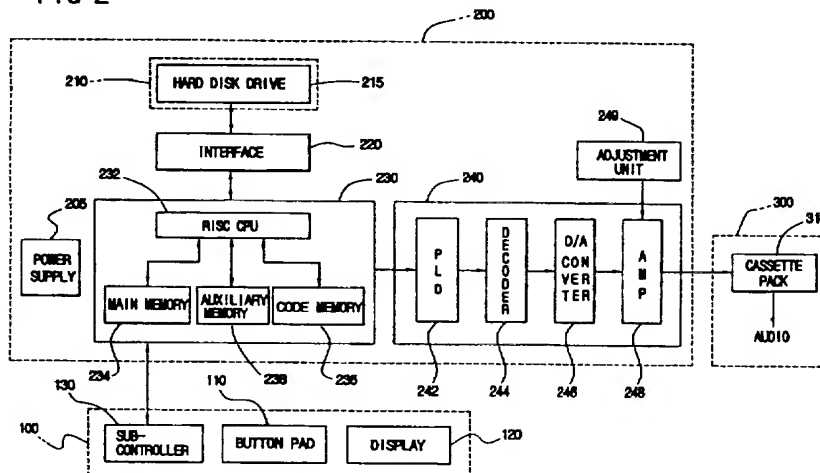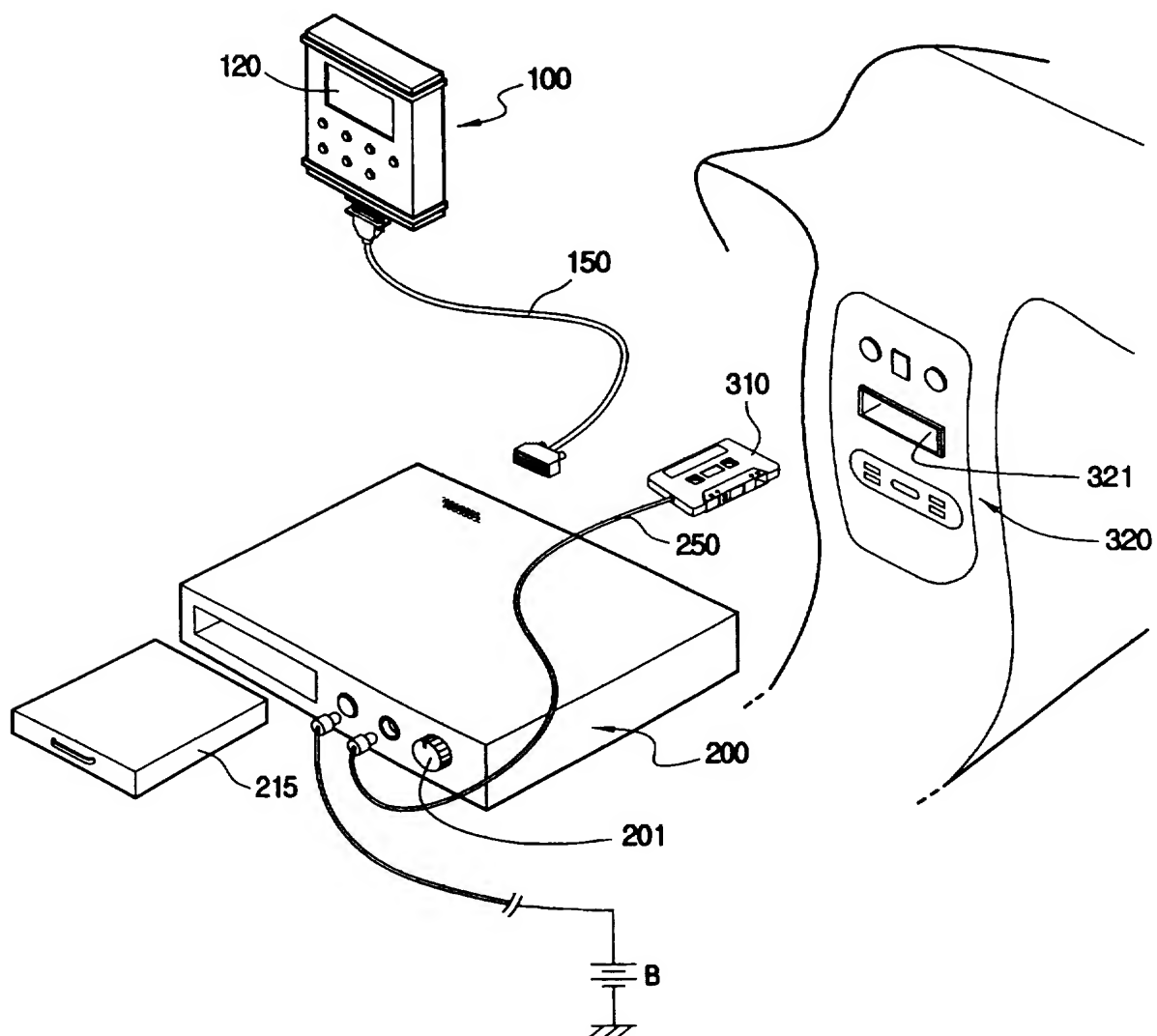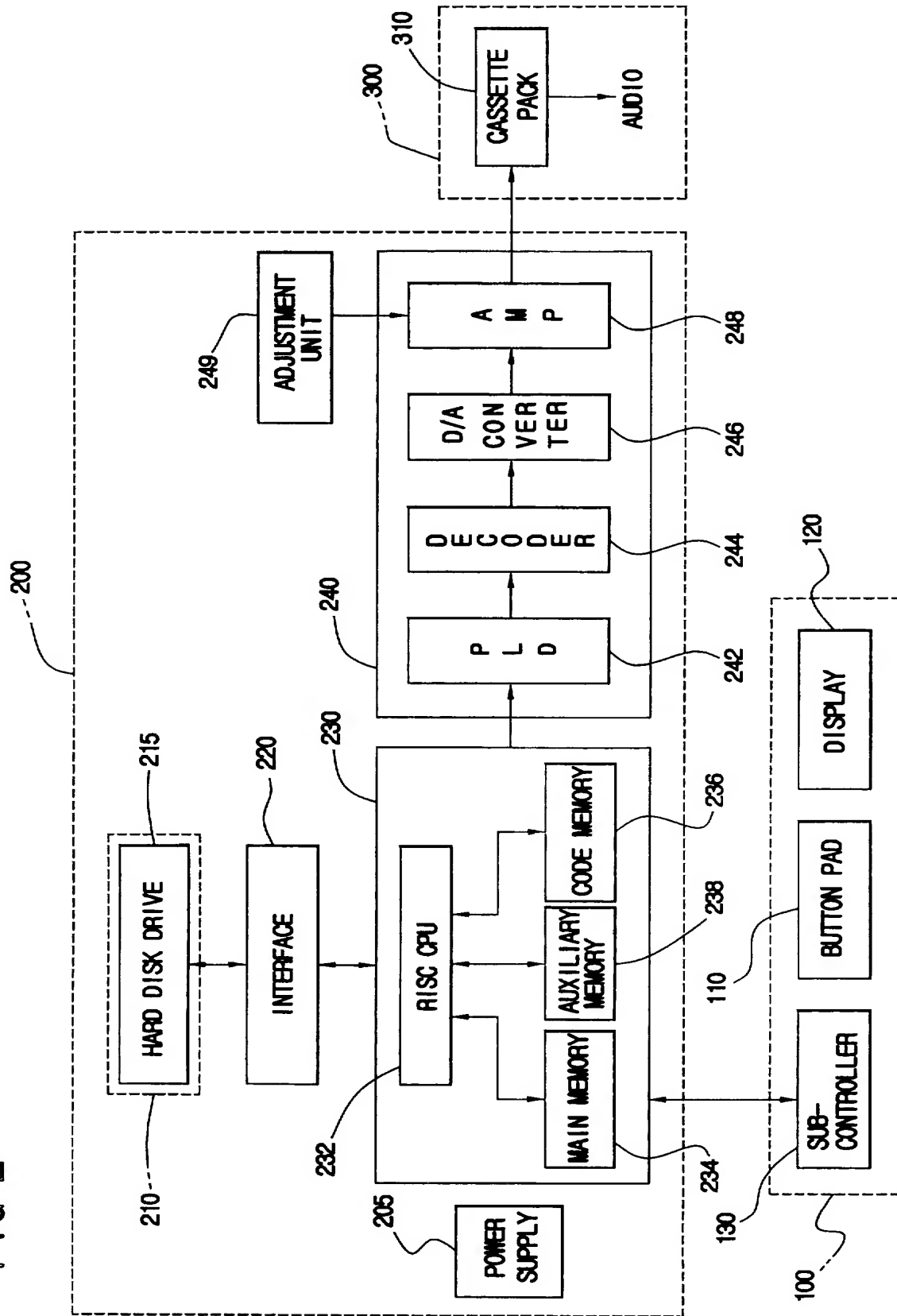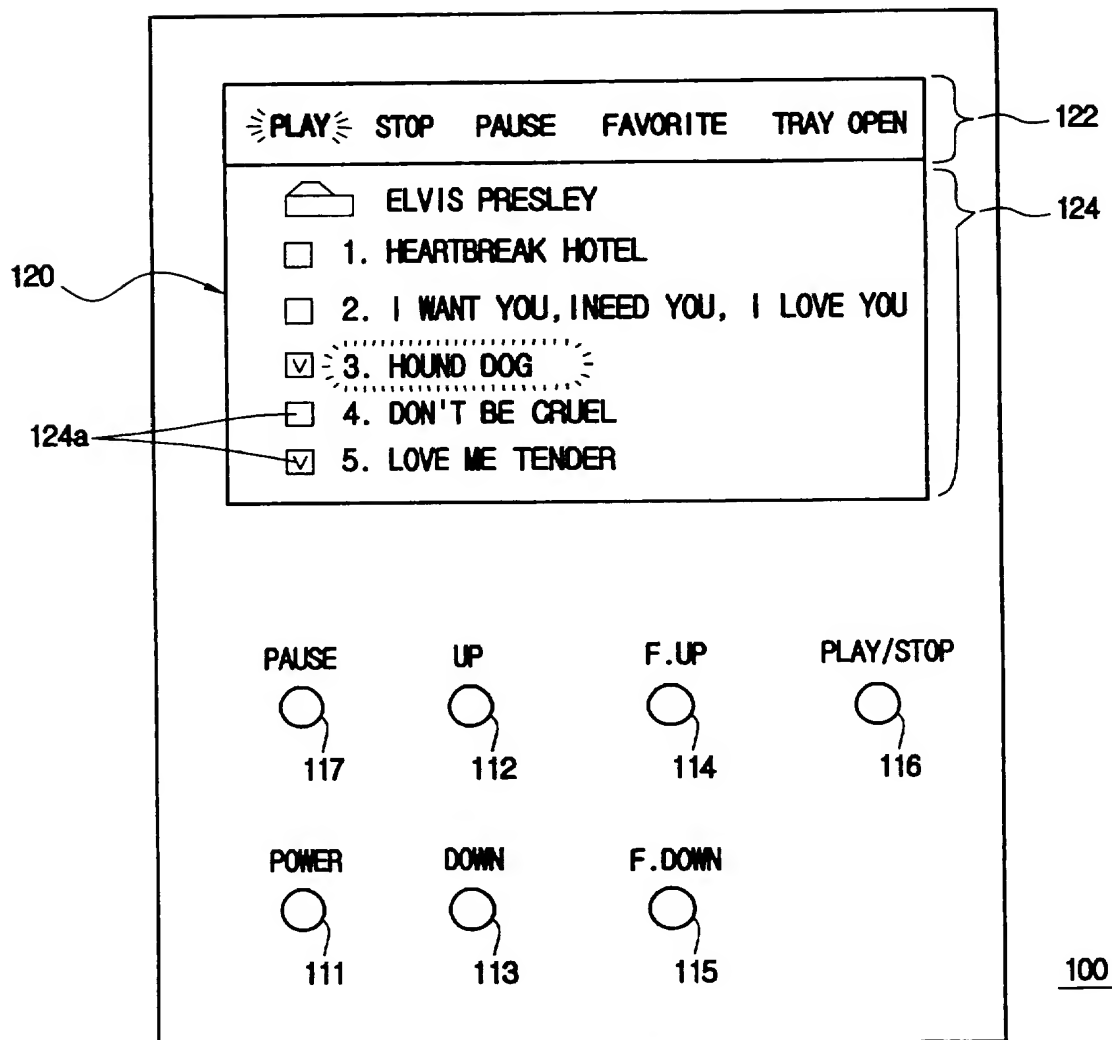
FIG 2



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FIG 1

# FIG 2

# FIG 3

# FIG 4a

```
┌─────────────────────────────┐
│          POWER ON           │
└─────────────────────────────┘
               │
               ▼
┌─────────────────────────────┐
│  INITIALIZE SYSTEM AND TURN │ ～ S11
│  OFF LOGO MUSIC AND PICTURE │
└─────────────────────────────┘
               │
               ▼
┌─────────────────────────────┐
│    STORE MUSIC FILE LIST    │ ～ S12
└─────────────────────────────┘
               │
               ▼
┌─────────────────────────────┐
│      TURN OFF LOGO MUSIC    │ ～ S13
│         AND PICTURE         │
└─────────────────────────────┘
               │
               ▼
┌─────────────────────────────┐
│    DISPLAY MUSIC FILE LIST  │ ～ S14
└─────────────────────────────┘
               │
               ▼
   S20 ──◇ BUTTON OPERATED ? ◇── N
           ◇               ◇
               │ Y                    S31
                                    ◇ REPRODUCTION ◇── N
                                    ◇  COMPLETED ? ◇
              ( B )          S32        │ Y
   ( A )                 ┌─────────────────────────────┐
                         │       HIGHLIGHT AND         │
                         │   REPRODUCE NEXT TUNE       │
                         └─────────────────────────────┘
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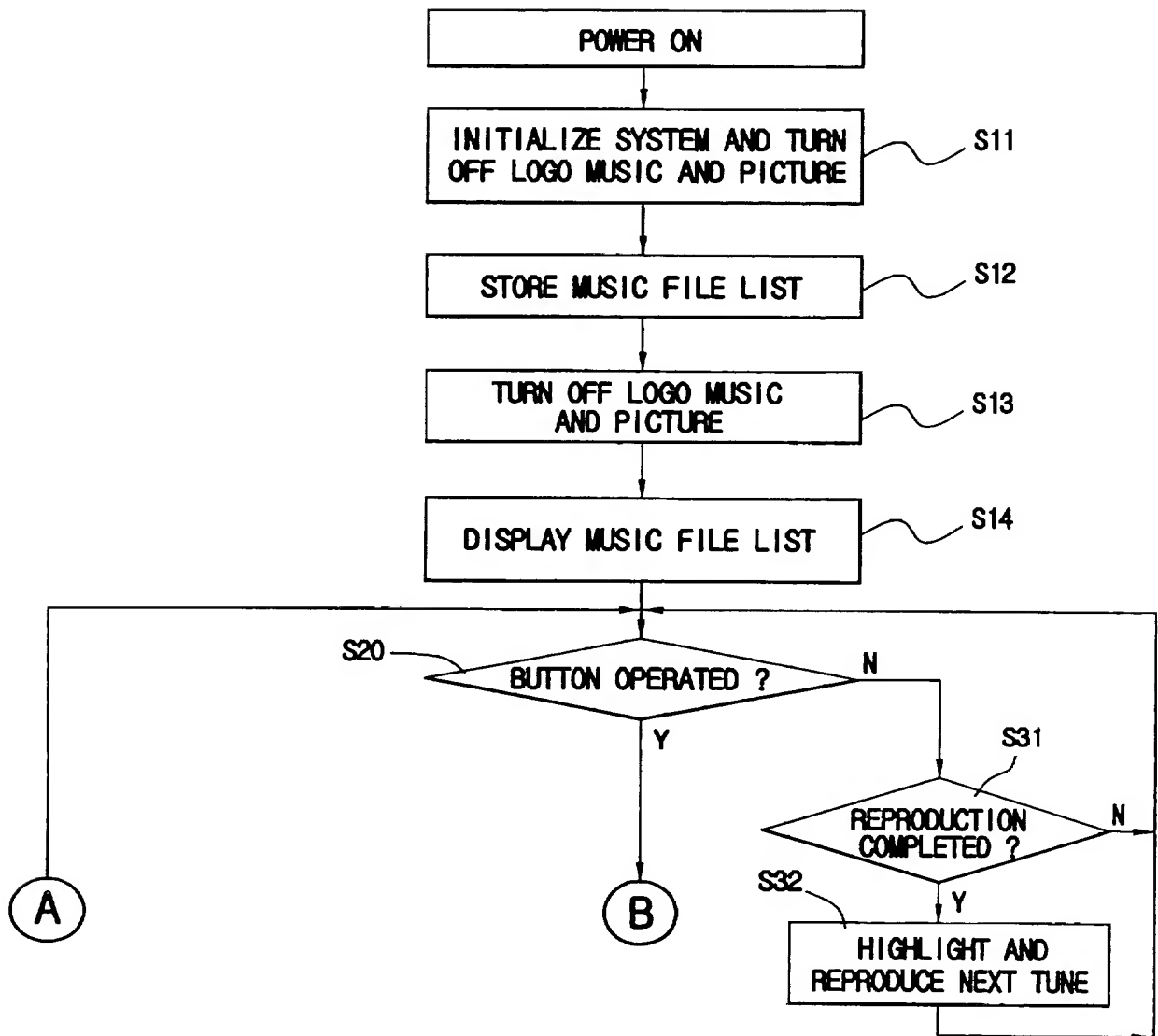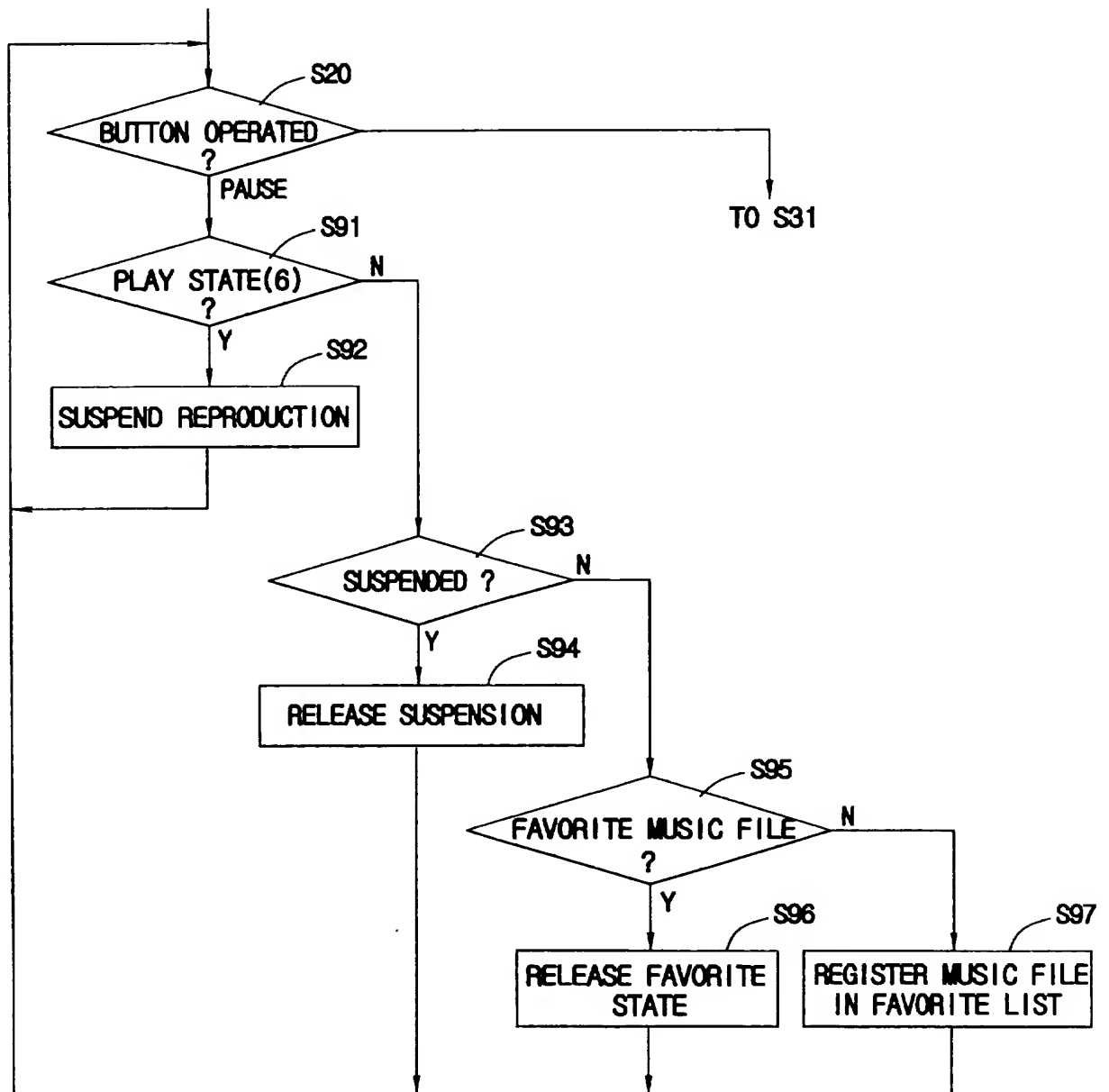
FIG 4b
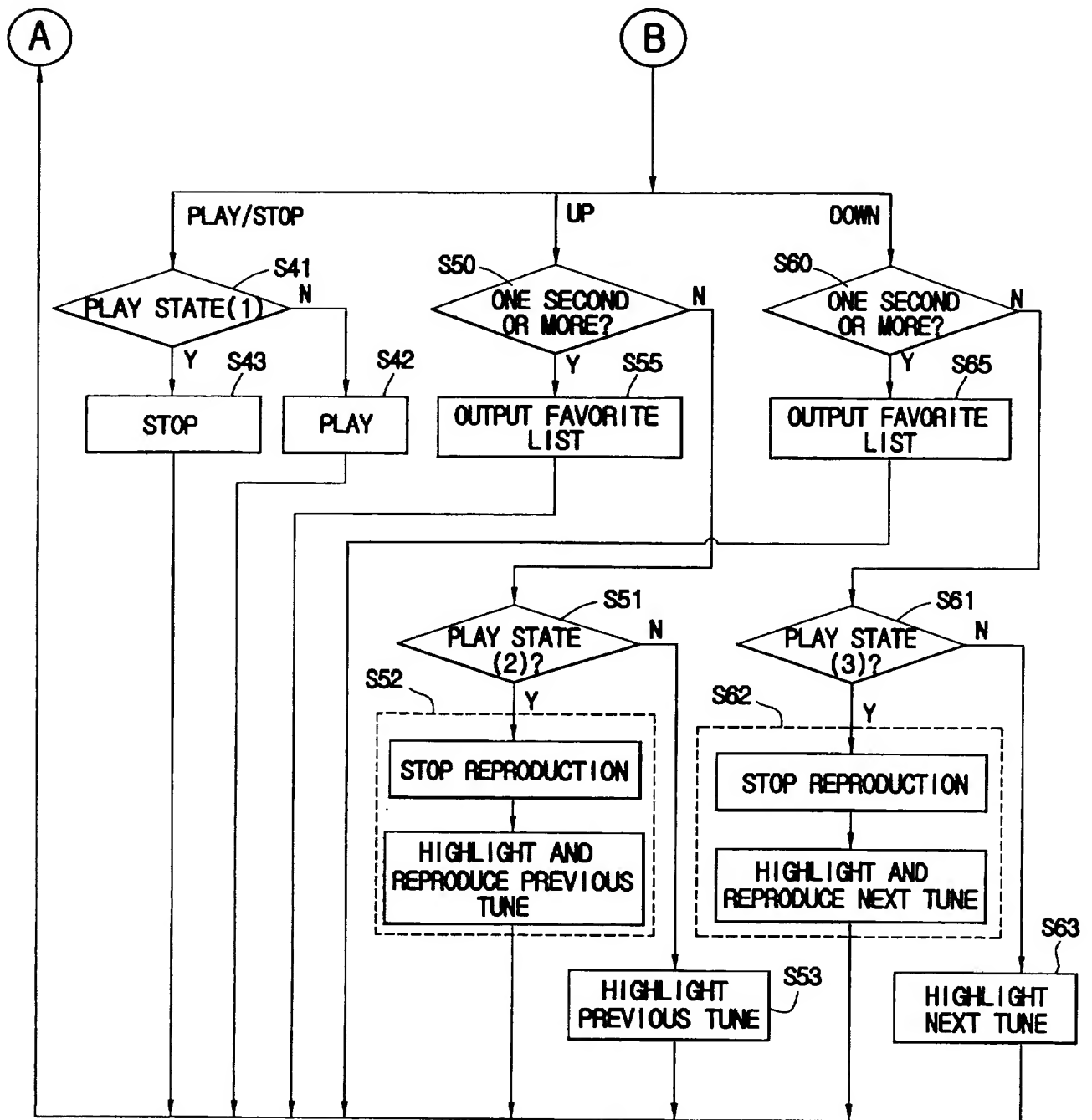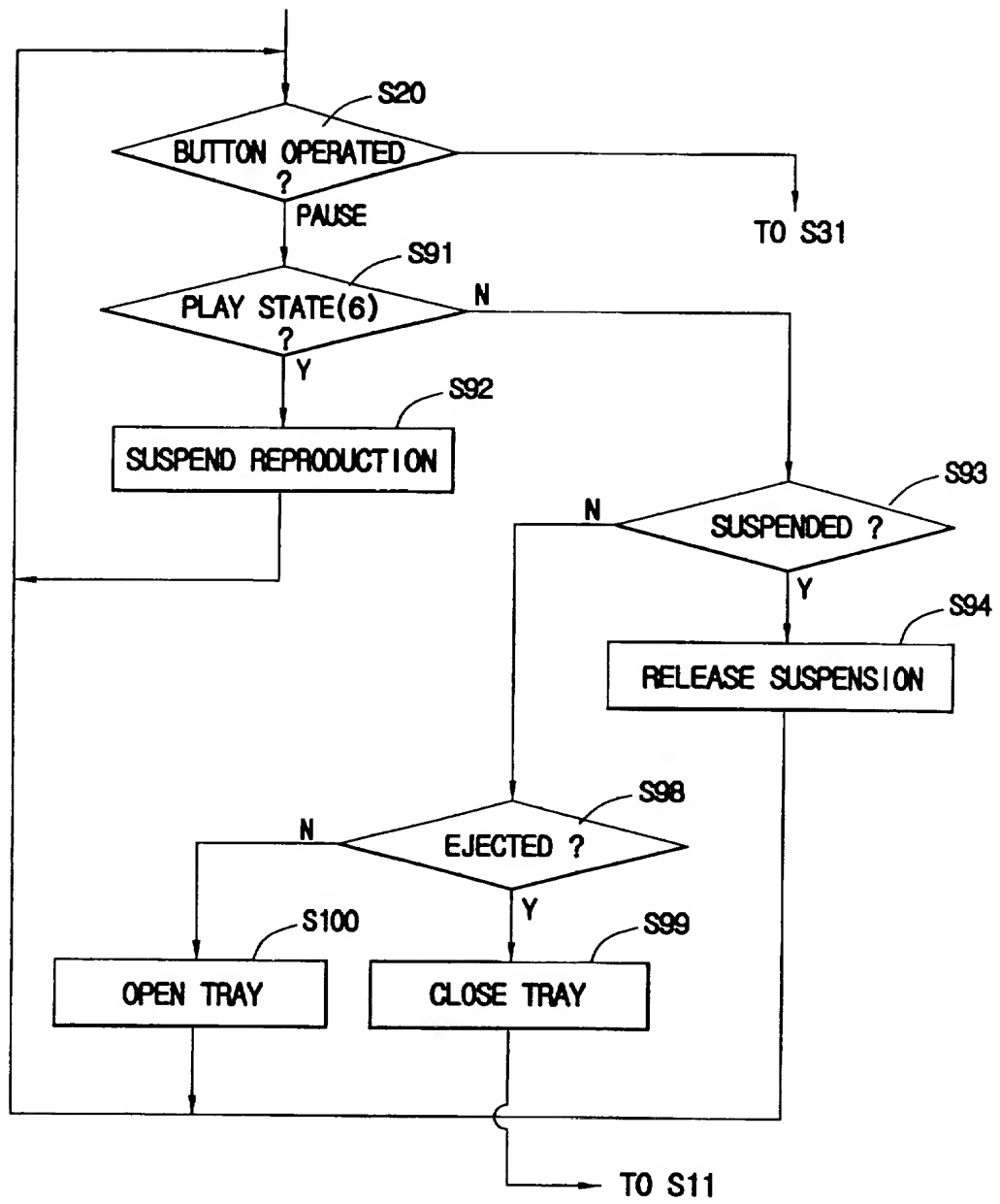
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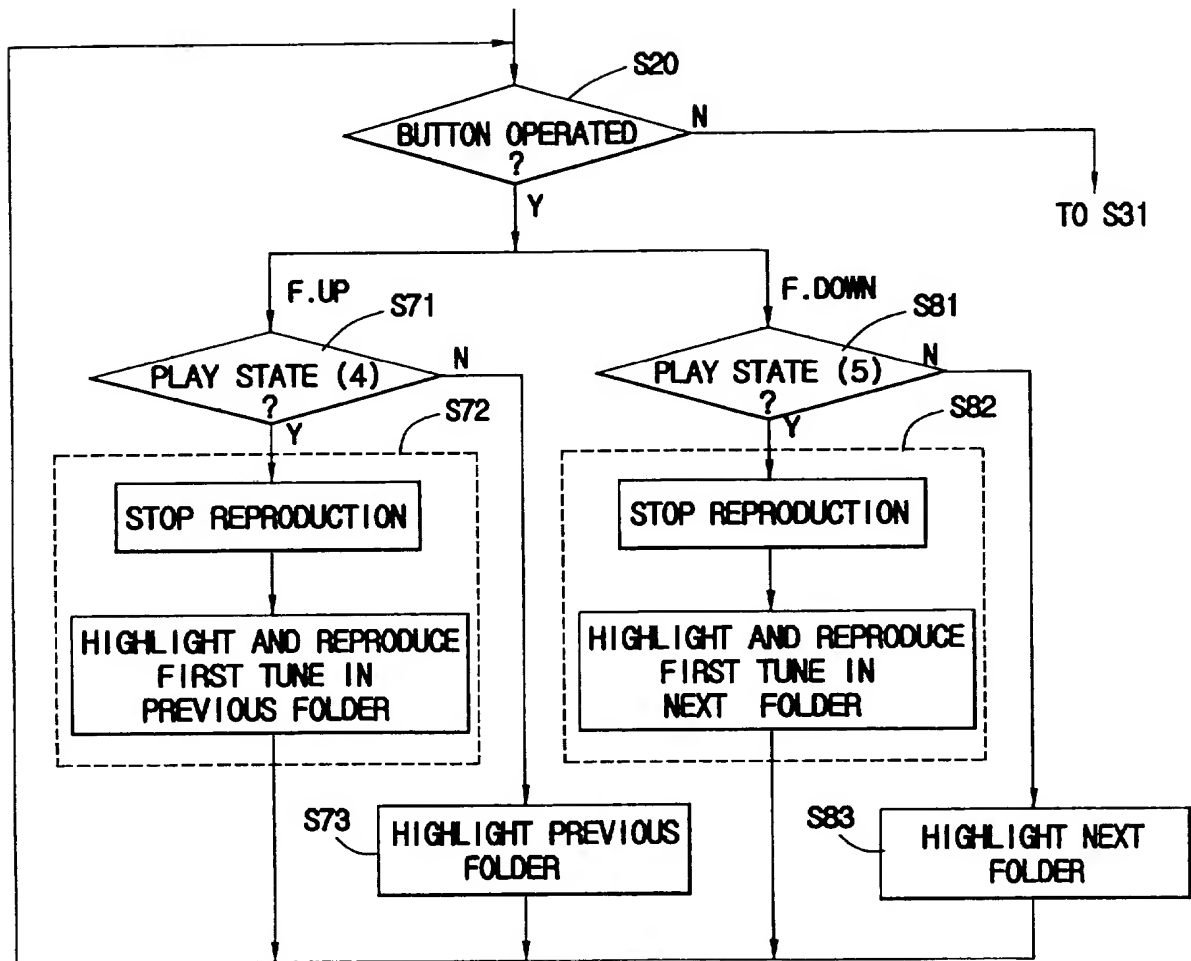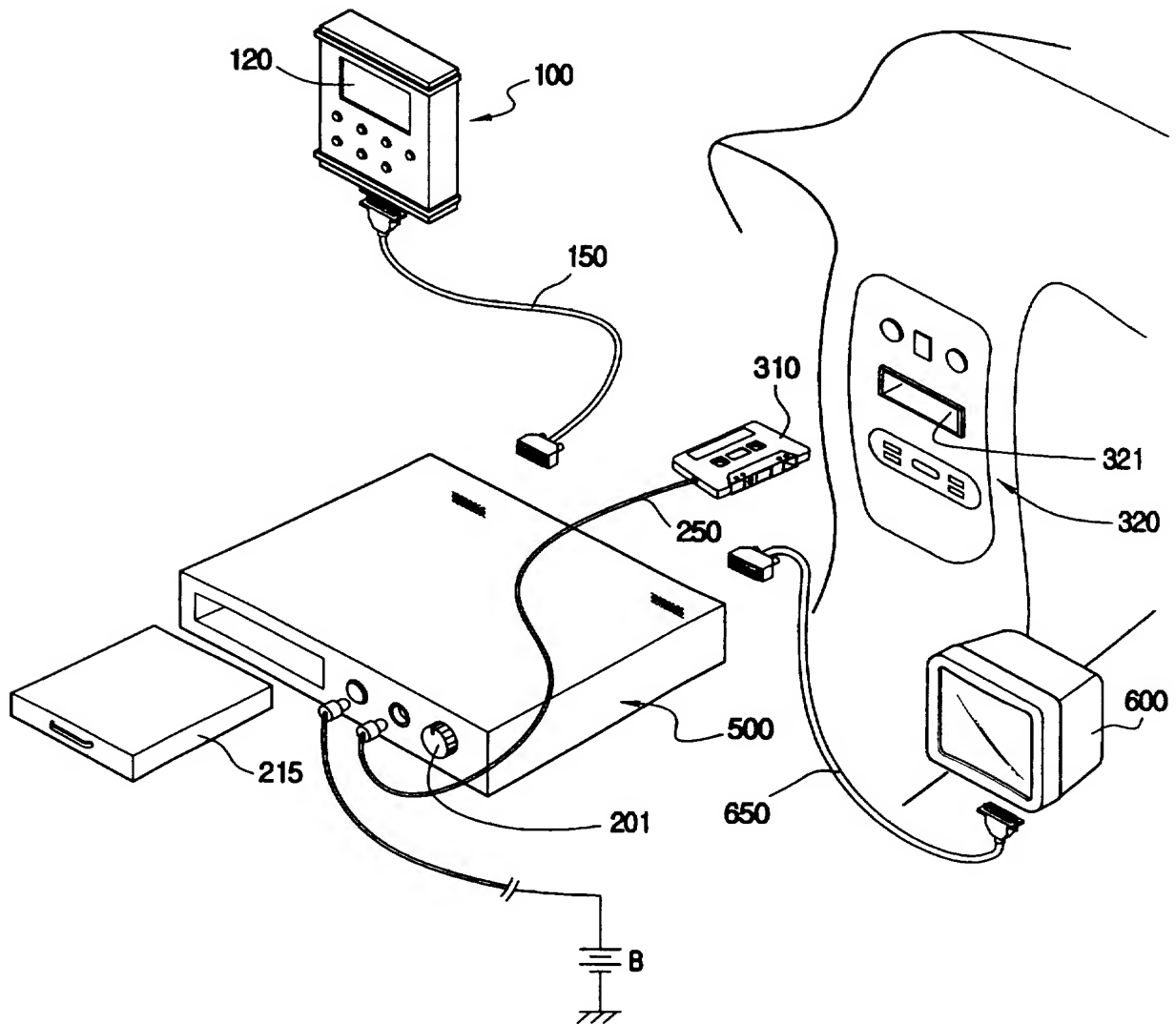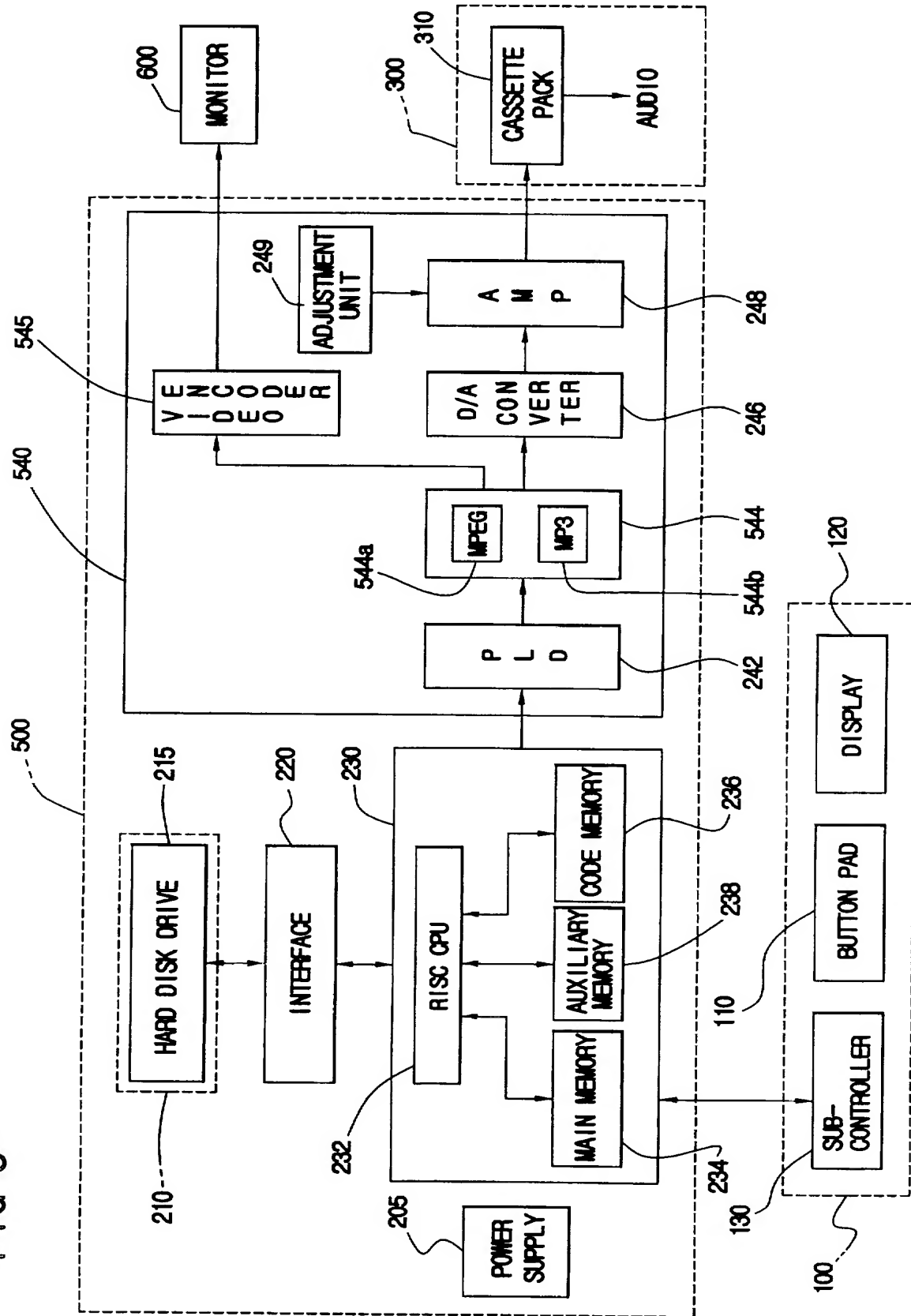
# FIG 6

FIG 7

# FIG 8

# FIG 9

DIGITAL FILE REPRODUCTION SYSTEM AND METHOD FOR DRIVING THE SAME

BACKGROUND OF THE INVENTION

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Field of the Invention

The present invention relates in general to the reproduction of digital files, and more particularly to a digital file reproduction system and a method for driving the

10    same, in which data of a large number of MP3 and video files stored in a hard disk drive are selectively outputted to the user, so that the user can readily select and listen to or view a desired one of thousands of music/movie files recorded with digital signals according to his taste or sentiment

15    without frequently replacing recording media.

Description of the Prior Art

Generally, an MP3 file is a kind of computer music file for recording audio data thereon. That is, the user is able

20    to download and listen to a desired tune in the form of a compressed file through Internet without using an audio recording device such as a recorder. Such a compressed file is so called an MP3 file. The user selectively downloads a desired tune in the form of an MP3 file through the Internet

25    and stores the downloaded MP3 file in a computer. Then, the

user expands the compressed MP3 file and outputs it to a speaker coupled with the computer. As a result, the user can listen to music of the downloaded MP3 file.

In other words, the user is able to selectively download only a desired music file, or MP3 file, using the computer. The introduction of such an MP3 file has the advantage of overcoming a conventional inconvenience resulting from the fact that the user has to purchase a compact disk (CD) or tape containing a plurality of undesired tunes to listen to one desired tune. As a result, there have recently been developed various types of portable MP3 file players capable of allowing the user to listen to music stored in an MP3 file at any place or time.

However, because MP3 file players, developed up to the present, are manufactured for portable use, they can store no more than ten odd MP3 files and are thus not suitable for use in homes or vehicles. In other words, in the case where the user intends to select and listen to a specific one of a large number of tunes belonging to various genres according to a given condition, he must have a plurality of MP3 file recording media, search the MP3 file recording media one by one for a recording medium recorded with a music file of the specific tune and insert the searched recording medium into a portable MP3 file player, resulting in an inconvenience in use.

Further, a movie CD can store no more than the contents of one or two movies as digital signals because of a limitation in capacity. For this reason, in order to collect and preserve a large number of favorite movies belonging to various genres, the user should purchase a CD corresponding to each of the movies. Moreover, the user has to carry a plurality of CDs to view a desired movie at a given time. This is also inconvenient to the user.

SUMMARY OF THE INVENTION

Therefore, the present invention has been made in view of the above problems, and it is an object of the present invention to provide a digital file reproduction system and a method for driving the same, in which thousands of MP3 and movie files are downloaded and stored in a hard disk drive installed in a computer and data of the stored MP3 and movie files are selectively outputted to the user, so that the user can readily select and listen to or view a desired one of the stored MP3 and movie files according to a given condition without frequently replacing recording media and the digital file reproduction system is thus suitable for use in homes or vehicles.

In accordance with one aspect of the present invention, the above and other objects can be accomplished by a provision

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of a digital file reproduction system comprising a body including a hard disk drive for storing a large number of music files compressed in an MP3 manner, a drive receiver having a space defined to receive the hard disk drive and

5  including means for reading a list and data of the music files stored on the hard disk drive, a body controller for reading the music file list stored on the hard disk drive through the drive receiver, storing and outputting the read music file list, selecting a specific one of the music files stored on

10  the hard disk drive in response to a control signal, reading data of the selected music file from the hard disk drive through the drive receiver and storing and outputting the read music file data, a signal processor for expanding the music file data from the body controller and converting the expanded

15  music file data into an analog voltage signal, and a power supply for supplying power to the system; a remote controller including a display for displaying the music file list stored in the body controller, a button pad for selecting the specific music file in the music file list displayed on the

20  display and instructing the body controller to output the data of the selected music file, and a sub-controller for receiving the music file list stored in the body controller, displaying it on the display, highlighting the specific music file selected by the button pad and outputting the control signal

25  to the body controller in response to the instruction from the

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button pad; and an audio generator for receiving the analog voltage signal from the signal processor in the body, converting it into an audio signal and outputting the converted audio signal externally.

5    In accordance with another aspect of the present invention, there is provided a digital file reproduction system comprising a body including a hard disk drive for storing a large number of movie files compressed in a digital manner, a drive receiver having a space defined to receive the

10   hard disk drive and including means for reading a list and data of the movie files stored on the hard disk drive, a body controller for reading the movie file list stored on the hard disk drive through the drive receiver, storing and outputting the read movie file list, selecting a specific one of the

15   movie files stored on the hard disk drive in response to a control signal, reading data of the selected movie file from the hard disk drive through the drive receiver and storing and outputting the read movie file data, a signal processor for expanding the movie file data from the body controller,

20   separating the expanded movie file data into a video signal and an audio signal and converting the separated video and audio signals respectively into analog video and audio signals, and a power supply for supplying power to the system; a remote controller including a display for displaying the

25   movie file list stored in the body controller, a button pad

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for selecting the specific movie file in the movie file list displayed on the display and instructing the body controller to output the data of the selected movie file, and a sub-controller for receiving the movie file list stored in the body controller, displaying it on the display, highlighting the specific movie file selected by the button pad and outputting the control signal to the body controller in response to the instruction from the button pad; an audio generator for receiving the analog audio signal from the signal processor in the body and outputting it externally; and a monitor for receiving the analog video signal from the signal processor in the body and displaying it on a screen.

In accordance with yet another aspect of the present invention, there is provided a method for driving a digital file reproduction system, comprising the steps of a) initializing the system if a power button of a remote controller is operated under the condition that a hard disk drive recorded with a large number of music files is installed in a drive receiver; b) reading a list of the music files recorded on the hard disk drive and storing it in a main memory; c) outputting the music file list stored in the main memory to the remote controller to display it on a display of the remote controller and highlighting a highest-order music file in the music file list displayed on the display; d) sensing an operation of a button pad of the remote controller;

and e) selecting and highlighting one music file in the music file list displayed on the display in response to the operation of the button pad sensed at the step d) and outputting data of the selected and highlighted music file through an audio generator.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, features and advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a view showing the appearance of a digital file reproduction system in accordance with an embodiment of the present invention;

Fig. 2 is a block diagram showing a detailed construction of the digital file reproduction system in Fig. 1;

Fig. 3 is a front view showing an example of a remote controller in Fig. 1;

Fig. 4 is a flowchart illustrating a method for driving the digital file reproduction system in accordance with the embodiment of the present invention;

Fig. 5 is a flowchart illustrating an example of steps that an output control step in Fig. 4 may additionally include;

Fig. 6 is a flowchart illustrating another example of steps that the output control step in Fig. 4 may additionally include;

Fig. 7 is a flowchart illustrating yet another example of steps that the output control step in Fig. 4 may additionally include;

Fig. 8 is a view showing the appearance of a digital file reproduction system in accordance with an alternative embodiment of the present invention; and

Fig. 9 is a block diagram showing a detailed construction of the digital file reproduction system in Fig. 8.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Figs. 1 to 7 show an embodiment of the present system and method applied to MP3 file reproduction, wherein Fig. 1 is a view showing the appearance of a digital file reproduction system in accordance with the embodiment of the present invention and Fig. 2 is a block diagram showing a detailed construction of the digital file reproduction system in Fig. 1. As shown in these drawings, the digital file reproduction system comprises a remote controller 100, body 200 and audio generator 300.

The body 200, which is a main component of the present invention, includes a power supply 205, drive receiver 210,

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hard disk drive (HDD) 215, body controller 230 and signal processor 240

The hard disk drive 215 is a storage medium for storing a large amount of music data compressed in the form of MP3 files through a computer. In the case where the hard disk drive 215 has a 10G-byte capacity, it is capable of storing MP3 music file data of more than 2000 tunes. In addition to a large amount of music file data, the hard disk drive 215 stores a music file list containing a plurality of folders into which titles of the music file data are arranged according to genres or singers.

The drive receiver 210 has a space defined on a portion of the body 200 for receiving the hard disk drive 215. Further, the drive receiver includes a circuitry for reading the music file list and music file data stored on the hard disk drive 215.

The body controller 230 is adapted to read the music file list stored on the hard disk drive 215 through the drive receiver 210, store it and output the stored music file list to the remote controller 100. The body controller 230 is further adapted to select a specific one of the music files stored on the hard disk drive 215 in response to a control signal from the remote controller 100, read data of the selected music file from the hard disk drive 215 through the drive receiver 210, store it and output the stored music file

data to the signal processor 240. To this end, the body controller 230 is provided with a central processing unit (CPU) 232, main memory 234 and code memory 236.

The code memory 236, which may preferably be an erasable

5 programmable read only memory (EPROM), stores a program for operating the body controller 230. The main memory 234, which may preferably be a dynamic random access memory (DRAM), stores the music file list and music file data read from the hard disk drive 215.

10 The CPU 232 is adapted to perform a control operation according to the program stored in the code memory 236. Namely, the CPU 232 reads the music file list stored in the hard disk drive 215, stores it in the main memory 234 and outputs the stored music file list to the remote controller

15 100. Further, the CPU 232 selects a specific one of the music files stored on the hard disk drive 215 in response to the control signal from the remote controller 100, reads data of the selected music file from the hard disk drive 215, stores it in the main memory 234 and outputs the stored music file

20 data to the signal processor 240. The CPU 232 may preferably be a restricted instruction set computer (RISC) CPU, which is a small-scale semiconductor device.

Preferably, the code memory 236 may store logo music and logo picture data. In this case, upon the initial operation

25 based on the program stored in the code memory 236, the CPU

232 outputs the logo music and logo picture data stored in the code memory 236 respectively to the audio generator 300 and remote controller 100. Preferably, an input/output interface (for example, E-IDE interface) 220 may be connected between the drive receiver 210 and body controller 230 to transfer control and data signals therebetween.

The signal processor 240 is adapted to expand the music file data from the body controller 230, convert the expanded music file data into an analog voltage signal and output the converted analog voltage signal to the audio generator 300. To this end, the signal processor 240 includes a programmable logic device (PLD) 242, multimedia decoder 244, digital/analog (D/A) converter 246 and amplifier 248. The audio generator 300 is adapted to receive the analog voltage signal from the signal processor 240, convert it into an audible audio signal and output the converted audio signal through a speaker connected thereto via an audio cable.

The PLD 242 is adapted to receive the music file data from the CPU 232 in the body controller 230 in a microprocessor bus manner and convert it into a serial digital signal. The multimedia decoder 244, which may preferably be an MP3 decoder, is connected to an output terminal of the PLD 242 to expand and decode the serial digital signal from the PLD 242. The D/A converter 246 is adapted to convert the decoded digital signal from the multimedia decoder 244 into an

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analog signal. The amplifier 248 is adapted to amplify power of the analog signal from the D/A converter 246 to a predetermined level and output the amplified analog signal to the audio generator 300. Preferably, an adjustment unit 249

5 may be additionally provided to adjust an amplification degree of the amplifier 248. More preferably, the adjustment unit 249 may be connected to a turn button 201 exposed out of the body 200, thereby allowing the user to readily adjust the amplification degree of the amplifier 248.

10 The power supply 205 is adapted to supply operating power to the drive receiver 210, body controller 230 and signal processor 240. In the case where the body 200 is installed in a vehicle, the power supply 205 may preferably be coupled with a 12V battery power source B provided in the vehicle.

15 The remote controller 100 is adapted to control the operation of the body 200 to selectively output a specific tune desired by the user. To this end, the remote controller 100 is connected to the body 200 via a 25-pin D-SDB cable 150 and includes a button pad 110, display 120 and sub-controller

20 130.

The sub-controller 130 is adapted to receive the music file list stored in the main memory 234 in the body controller 230 and display it on the display 120. The sub-controller 130 is further adapted to highlight the above-mentioned specific

25 music file (selected by the button pad 110 as will be

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mentioned later in detail) in the music file list displayed on the display 120 and output the above-mentioned control signal to the body controller 230 to output the data of the selected music file as stated previously.

The button pad 110 is adapted to select one music file in the music file list displayed on the display 120 and instruct the body controller 230 to output the data of the selected music file. To this end, the button pad 110 includes a power button 111, up button 112, down button 113, folder up button 114, folder down button 115, play/stop button 116 and pause button 117.

The power button 111 acts to energize the body 200 and remote controller 100. Namely, if the power button 111 is operated, then the power supply 205 in the body 200 supplies power to the body 200 and remote controller 100 to energize the components therein.

The up or down button 112 or 113 functions to select one music file in the music file list displayed on the display 120. That is, if the up button 112 is operated, then a music file preceding a current music file is selected and highlighted on the display 120. If the down button 113 is operated, then a music file following the current music file is selected and highlighted on the display 120.

The play/stop button 116 acts to control the output of music file data from the body 200. Namely, whenever the

play/stop button 116 is operated, the body 200 repeats the output and stop of data of a currently selected music file. Herein, the output of the selected music file data after being stopped is resumed from the beginning.

5      Music files on the hard disk drive 215 may be classified according to genres or singers and data of the music files of each genre or singer may be stored in a folder corresponding to each genre or singer. In this case, the folder up or down button 114 or 115 is used to select one folder in the music
10    file list and scan music files stored in the selected folder. That is, if the folder up button 114 is operated, then a folder preceding one to which a current music file belongs is selected and highlighted on the display 120. If the folder down button 115 is operated, then a folder following one to
15    which the current music file belongs is selected and highlighted on the display 120. When the folder up or down button 114 or 115 is operated while data of a certain music file is outputted, the output of the music file data is stopped and data of a first music file in a shifted folder is
20    read and outputted from the hard disk drive 215.

       The pause button 117 functions to suspend the output of music file data being reproduced. Whenever the pause button 117 is operated, the suspension and output of music file data being reproduced are repeated. Herein, the output of music
25    file data after suspension is resumed from the just previous

one.

The display 120 functions to display the music file list stored in the main memory 234 in the body controller 230 and highlight a music file selected by the button pad 110.

5    Although the display 120 may be configured to display only the music file list, it may preferably include an operation display part 122 defined on its upper portion for displaying a current control state of the body 200 to be checked by the user.    In this case, the operating part 122 10 contains a series of characters such as PLAY, STOP, PAUSE and TRAY OPEN, which are highlighted respectively whenever data of a selected music file is outputted, stopped or suspended or a tray is open.

Preferably, the button pad 110 of the remote controller 15 100 may further include a favorite selection function of selecting user's favorite music files in the music file list displayed on the display 120, and a favorite list display function of displaying a list of the music files selected by the favorite selection function on the display 120.    Further, 20 the body controller 230 may include an auxiliary memory 238 for storing the list of the music files selected by the favorite selection function as a favorite list.    When the favorite list display function is performed, the CPU 232 in the body controller 230 outputs the favorite list stored in 25 the auxiliary memory 238 to the remote controller 100 to

display it on the display 120. The auxiliary memory 238 may preferably be an electrically erasable and programmable read only memory (EEPROM).

Although separate buttons may be provided on the button pad 110 in addition to the existing buttons to perform the favorite selection function and favorite list display function, the existing buttons may perform those functions as well as their eigen functions. For example, when the pause button 117 is operated under the condition that the music file reproduction is stopped, the favorite selection function may be performed to select a music file highlighted on the display 120 as a favorite music file. Also, when the up or down button 112 or 113 is operated for a time period of one second or more, the favorite list display function may be performed to display the favorite list stored in the body controller 230 on the display 120.

Such favorite selection function and favorite list display function are performed to arrange user's favorite music files separately from others and store and display them. Hence, the use of such favorite selection function and favorite list display function has the advantage of overcoming an inconvenience resulting from the fact that the user has to search thousands of music files stored on the hard disk drive 215 one by one for his favorite music files whenever intending to select the favorite music files. Fig. 3 shows an example

where, when a music file is selected by the favorite selection function, a check mark is displayed in a rectangular box 124a corresponding to the selected music file to indicate the favorite music file selection. In this case, the auxiliary memory 238 stores a favorite list consisting of only titles of music files with their rectangular boxes 124a displayed with the check marks. Further, if the favorite selection function is performed once more under the condition that a music file selected as a favorite one is specified on the display 120, that music file is deleted from the favorite list.

The audio generator 300 is adapted to receive the analog voltage signal from the signal processor 240 in the body 200, convert it into an audible audio signal and output the converted audio signal through a speaker connected thereto via an audio cable. To this end, the audio generator 300 includes a cassette pack 310 and audio set 320.

The cassette pack 310 acts to convert the analog voltage signal from the signal processor 240 into a magnetic signal to be sensed by a head of a cassette driver 321 in the audio set 320. As shown in Fig. 1, the cassette pack 310 is shaped to be insertable into the cassette driver 321, and connected to an output terminal of the signal processor 240 in the body 200 via a cable 250. The audio set 320 is a conventional system which reads a magnetic signal on a cassette tape inserted thereinto, converts it into an audio signal and outputs the

converted audio signal externally. In the present embodiment, the audio set 320 may be a car audio set or home audio set. Therefore, the analog voltage signal from the signal processor 240 is converted by the cassette pack 310 into a magnetic signal, which is then sensed by the head of the cassette driver 321 in the audio set 320. Then, the audio set 320 converts the sensed magnetic signal into an audio signal and outputs the converted audio signal through the speaker.

The reason why the audio generator 300 comprises the cassette pack 310 as well as the audio set 320 is that a speaker of a general home audio set or car audio set has no line-in terminal capable of directly receiving an audio voltage signal. Provided that a speaker has the line-in terminal capable of directly receiving the audio voltage signal, it will constitute the audio generator 300 by itself.

Although the hard disk drive 215 is used as a preferred music file storage medium in the present embodiment, it may be substituted with a typical CD-ROM drive. In the case where the CD-ROM drive is installed in the body 200, an eject button may additionally be provided on the button pad 110 of the remote controller 100 to eject an inserted CD from the body 200.

Now, a description will be given of a method for driving the digital file reproduction system with the above-mentioned construction in accordance with the embodiment of the present

invention with reference to Figs. 4 to 7.

Fig. 4 is a flowchart illustrating the method for driving the digital file reproduction system in accordance with the embodiment of the present invention. As shown in this drawing, the digital file reproduction system driving method comprises a start step S11, list storage step S12, list output step S14, button operation sensing step S20 and output control step.

First, if the user operates the power button 111 of the remote controller 100 under the condition that the hard disk drive 215 recorded with a large amount of music file data and a music file list is installed in the drive receiver 210, the power supply 205 supplies power to the remote controller 100 and body 200 and the CPU 232 in the body 200 thus initializes the system according to the program stored in the code memory 236 at the start step S11.

After initializing the system at the above start step S11, the CPU 232 reads the music file list recorded on the hard disk drive 215 and stores it in the main memory 234 at the list storage step S12. Then, the CPU 232 outputs the music file list stored in the main memory 234 to the remote controller 100 to display it on the display 120 at the list output step S14. At this time, the sub-controller 130 of the remote controller 100 highlights a highest-order music file in the music file list displayed on the display 120.

In the case where logo music and logo picture data are stored in the code memory 236, the CPU 232 may perform the step of outputting the logo music and logo picture data stored in the code memory 236 together with the system initialization

5    at the above start step S11. In this case, the CPU 232 outputs the logo picture data to the remote controller 100 to display a logo picture on the display 120. Further, the CPU 232 outputs the logo music data to the signal processor 240 to output logo music through the audio generator 300. In the

10   case where the CPU 232 performs the above step of outputting the logo picture and logo music data, then it performs, first after the list storage step S12, a logo output completion step S13 of completing the output of the logo music and logo picture data and thereafter the list output step S14.

15   After the above list output step S14 is performed, the button operation sensing step S20 is performed to sense the operation of the button pad 110 of the remote controller 100 and the output control step is then performed.

At the above output control step, the sub-controller 130

20   of the remote controller 100 selects and highlights one music file in the music file list displayed on the display 120 of the remote controller 100 in response to the operation of the button pad 110 sensed at the above button operation sensing step S20, and the CPU 232 outputs data of the selected and

25   highlighted music file to the signal processor 240 to output

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it as an audio signal through the audio generator 300.

While any operation of the button pad 110 is not sensed at the above button pad sensing step S20, a reproduction completion determination step S31 may be performed to determine whether the output of music file data being reproduced has been completed. If it is determined at the reproduction completion determination step S31 that the current state is not a play state or music file data is being reproduced, the system operation returns to the above button operation sensing step S20. However, in the case where it is determined at the reproduction completion determination step S31 that the output of music file data being reproduced has been completed, the system operation proceeds to a next tune reproduction step S32 of automatically selecting and outputting a next tune

At the next tune reproduction step S32, the sub-controller 130 of the remote controller 100 highlights a music file of the next tune on the display 120 of the remote controller 100, and the CPU 232 reads data of the highlighted music file from the hard disk drive 215 and stores it in the main memory 234. The CPU 232 then outputs the stored music file data to the signal processor 240 to output it through the audio generator 300.

Preferably, the output control step may include a first state determination step S41, play step S42, stop step S43,

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second state determination step S51, previous tune reproduction step S52, previous tune selection step S53, third state determination step S61, next tune reproduction step S62 and next tune selection step S63.

In the case where it is sensed at the above button operation sensing step S20 that the play/stop button 116 is operated, the first state determination step S41 is performed to determine whether the current state is the play state. Upon determining at the first state determination step S41 that the current state is the play state, the stop step S43 is performed to stop the output of music file data being reproduced and then return to the button operation sensing step S20. If it is determined at the first state determination step S41 that the current state is not the play state but a stop state, the play step S42 is performed to output data of a music file highlighted on the display 120 of the remote controller 100 through the audio generator 300.

Namely, at the play step S42, the CPU 232 reads data of a music file highlighted on the display 120 from the hard disk drive 215 through the interface 220, stores it in the main memory 234 and outputs the stored music file data to the signal processor 240. Subsequently, in the signal processor 240, the PLD 242 converts the music file data from the CPU 232 into a serial digital signal, which is then expanded and decoded by the multimedia decoder 244. The D/A converter 246

converts the decoded digital signal from the multimedia decoder 244 into an analog signal. The amplifier 248 amplifies power of the analog signal from the D/A converter 246 to a predetermined level and outputs the resultant analog audio voltage signal to the audio generator 300 through a line-out terminal provided on a portion of the body 200. Then, in the audio generator 300, the analog audio voltage signal from the signal processor 240 is converted by the cassette pack 310 into a magnetic signal, which is then sensed by the head of the cassette driver 321 in the audio set 320, into which the cassette pack 310 is inserted. Subsequently, the audio set 320 converts the sensed magnetic signal into an audio signal and outputs the converted audio signal through the speaker. After this play step S42 is performed, the system operation returns to the button operation sensing step S20.

In the case where it is sensed at the above button operation sensing step S20 that the up button 112 is operated, the second state determination step S51 is performed to determine whether the current state is the play state. Upon determining at the second state determination step S51 that the current state is not the play state, the previous tune selection step S53 is performed to highlight a music file of a tune preceding one currently highlighted on the display 120 of the remote controller 100 and then return to the button

operation sensing step S20.

If it is determined at the second state determination step S51 that the current state is the play state, the previous tune reproduction step S52 is performed to stop the output of music file data being reproduced, read data of a music file of a tune preceding a currently reproduced one from the hard disk drive 215, store it in the main memory 234 and output the stored music file data to the signal processor 240. That is, at the previous tune reproduction step S52, data of a music file of a tune preceding one reproduced just before the operation of the up button 112 is outputted as an audio signal through the audio generator 300. After performing the previous tune reproduction step S52, the system operation returns to the button operation sensing step S20.

In the case where it is sensed at the above button operation sensing step S20 that the down button 113 is operated, the third state determination step S61 is performed to determine whether the current state is the play state. If it is determined at the third state determination step S61 that the current state is not the play state, the next tune selection step S63 is performed to highlight a music file of a tune following one currently highlighted on the display 120 of the remote controller 100 and then return to the button operation sensing step S20.

If it is determined at the third state determination step

S61 that the current state is the play state, the next tune reproduction step S62 is performed to stop the output of music file data being reproduced, read data of a music file of a tune following a currently reproduced one from the hard disk drive 215, store it in the main memory 234 and output the stored music file data to the signal processor 240. Namely, at the next tune reproduction step S62, data of a music file of a tune following one reproduced just before the operation of the down button 113 is outputted as an audio signal through the audio generator 300. After performing the next tune reproduction step S62, the system operation returns to the button operation sensing step S20.

On the other hand, the up/down buttons 112 and 113 may have the favorite list display function as well as their eigen functions. In this case, when the up or down button 112 or 113 is pushed for a time period of one second or more, the favorite list display function is performed. If the up or down button 112 or 113 is pushed for a time period of less than one second, then the second or third state determination step S51 or S61 is performed.

In other words, if the up or down button 112 or 113 is operated, then sub-controller 130 determines at step S50 or S60 whether the up or down button 112 or 113 has been pushed for a time period of one second or more. Upon determining at step S50 or S60 that the up or down button 112 or 113 has been

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pushed for a time period of one second or more, the sub-controller 130 performs a favorite list display step S55 or S65 of receiving the favorite list stored in the auxiliary memory 238 in the body controller 230 and displaying it on the display 120. If it is determined at step S50 or S60 that the up or down button 112 or 113 has been pushed for a time period of less than one second, the second or third state determination step S51 or S61 is performed to determine whether the current state is the play state.

On the other hand, music files may be stored on the hard disk drive 215 in the unit of folders. In this case, as shown in Fig. 5, the above output control step may further include a fourth state determination step S71, previous folder reproduction step S72, previous folder selection step S73, fifth state determination step S81, next folder reproduction step S82 and next folder selection step S83.

That is, in the case where it is sensed at the above button operation sensing step S20 that the folder up button 114 is operated, the fourth state determination step S71 is performed to determine whether the current state is the play state. Upon determining at the fourth state determination step S71 that the current state is not the play state, the previous folder selection step S73 is performed to highlight a folder preceding one with a music file currently highlighted on the display 120 of the remote controller 100 and then

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return to the button operation sensing step S20.

If it is determined at the fourth state determination step S71 that the current state is the play state, the previous folder reproduction step S72 is performed to stop the output of music file data being reproduced, highlight a first music file in a folder preceding one with a currently reproduced music file on the display 120 of the remote controller 100, read data of the highlighted music file from the hard disk drive 215, store it in the main memory 234 and output the stored music file data to the signal processor 240. That is, at the previous folder reproduction step S72, music file data of a first tune in a folder preceding one with a tune reproduced just before the operation of the folder up button 114 is outputted as an audio signal through the audio generator 300. After performing the previous folder reproduction step S72, the system operation returns to the button operation sensing step S20.

In the case where it is sensed at the above button operation sensing step S20 that the folder down button 115 is operated, the fifth state determination step S81 is performed to determine whether the current state is the play state. If it is determined at the fifth state determination step S81 that the current state is not the play state, the next folder selection step S83 is performed to highlight a folder following one with a music file currently highlighted on the

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display 120 of the remote controller 100 and then return to the button operation sensing step S20.

If it is determined at the fifth state determination step S81 that the current state is the play state, the next folder reproduction step S82 is performed to stop the output of music file data being reproduced, highlight a first music file in a folder following one with a currently reproduced music file on the display 120 of the remote controller 100, read data of the highlighted music file from the hard disk drive 215, store it in the main memory 234 and output the stored music file data to the signal processor 240. Namely, at the next folder reproduction step S82, music file data of a first tune in a folder following one with a tune reproduced just before the operation of the folder down button 115 is outputted as an audio signal through the audio generator 300. After performing the next folder reproduction step S82, the system operation returns to the button operation sensing step S20.

On the other hand, the digital file reproduction system of the present invention may preferably comprise a pause function. In this case, as shown in Figs. 6 and 7, the above output control step may further include a sixth state determination step S91, pause step S92 and pause release step S94.

In the case where it is sensed at the above button operation sensing step S20 that the pause button 117 is

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operated, the six state determination step S91 is performed to determine whether the current state is the play state. If it is determined at the six state determination step S91 that the current state is the play state, the pause step S92 is
5   performed to suspend the output of music file data being reproduced and then return to the button operation sensing step S20. In the case where it is determined at the sixth state determination step S91 that the current state is not the play state and it is determined at a pause determination step
10  S93 that the current state is a pause state, the pause release step S94 is performed to release the suspension of music file data output to resume the output of music file data reproduced before being suspended.

Fig. 6 is a flowchart illustrating the case where the
15  pause button 117 has the favorite selection function in addition to its eigen function. If it is sensed at the above button operation sensing step S20 that the pause button 117 is operated, the six state determination step S91 is performed to determine whether the current state is the play state. If it
20  is determined at the six state determination step S91 that the current state is the play state, the pause step S92 is performed to suspend the output of music file data being reproduced. In the case where it is determined at the sixth state determination step S91 that the current state is not the
25  play state, the pause determination step S93 is performed to

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determine whether the current state is the pause state. Upon determining at the pause determination step S93 that the current state is the pause state, the pause release step S94 is performed to release the suspension of music file data output.

In the case where it is determined at the above pause determination step S93 that the current state is not the pause state, the system recognizes that the pause button 117 is operated to execute the favorite selection function under the condition that the current state is neither the play state nor pause state and then performs the operation related to the favorite selection function.

Namely, if it is determined at the pause determination step S93 that the current state is not the pause state, a favorite determination step S95 is performed to determine whether a music file highlighted on the display 120 of the remote controller 120 belongs to the favorite list. Upon determining at the favorite determination step S95 that the highlighted music file belongs to the favorite list, a favorite release step S96 is performed to delete the highlighted music file from the favorite list. In the case where it is determined at the favorite determination step S95 that the highlighted music file does not belong to the favorite list, a favorite registration step S97 is performed to register the highlighted music file in the favorite list.

After performing the favorite release step S96 and favorite registration step S97, the system operation returns to the button operation sensing step S20.

Fig. 7 is a flowchart illustrating the case where a CD-ROM drive is applied to the body 200 instead of the hard disk drive 215 and the pause button 117 has an eject function for opening/closing a CD-ROM tray, in addition to its eigen function.

In the case where it is sensed at the above button operation sensing step S20 that the pause button 117 is operated, the six state determination step S91 is performed to determine whether the current state is the play state. If it is determined at the six state determination step S91 that the current state is the play state, the pause step S92 is performed to suspend the output of music file data being reproduced. If it is determined at the sixth state determination step S91 that the current state is not the play state, the pause determination step S93 is performed to determine whether the current state is the pause state. Upon determining at the pause determination step S93 that the current state is the pause state, the pause release step S94 is performed to release the suspension of music file data output.

If it is determined at the above pause determination step S93 that the current state is not the pause state, the system

recognizes that the pause button 117 is operated to control the opening/closing of the CD-ROM tray under the condition that the current state is neither the play state nor pause state and then performs the operation related to the eject

5    function.    That is, if it is determined at the pause determination step S93 that the current state is not the pause state, an eject determination step S98 is performed to determine whether the CD-ROM tray is at its opened state. Upon determining at the eject determination step S98 that the

10   CD-ROM tray is at its opened state, a tray closing step S99 is performed to close the CD-ROM tray and then return to the start step S11 to initialize the system again.    In the case where it is determined at the eject determination step S98 that the CD-ROM tray is at its closed state, a tray opening

15   step S100 is performed to open the CD-ROM tray and then return to the button operation sensing step S20.

Figs. 8 and 9 show an alternative embodiment of the present system applied to movie file reproduction, wherein Fig. 8 is a view showing the appearance of a digital file

20   reproduction system in accordance with the alternative embodiment of the present invention and Fig. 9 is a block diagram showing a detailed construction of the digital file reproduction system in Fig. 8.    As shown in these drawings, the digital file reproduction system comprises a remote

25   controller 100, body 500, audio generator 300 and monitor 600.

The second embodiment for the movie file reproduction is substantially the same in construction and operation as the first embodiment for the MP3 music file reproduction, with the exception that a large number of movie files are stored on the

5 hard disk drive 215, a multimedia decoder circuit 544 is provided to process a video signal as well as an audio signal and a video encoder 545 and monitor 600 are further provided to process the video signal. Therefore, in the second embodiment, the same parts as those in the first embodiment

10 are denoted by the same reference numerals and a detailed description thereof will thus be omitted.

The multimedia decoder circuit 544 is connected to the output terminal of the PLD 242 to separate an output signal from the PLD 242 into a video signal and an audio signal and

15 decode the separated video and audio signals. To this end, the multimedia decoder circuit 544 includes a moving picture experts group (MPEG) decoder 544a for decoding the video signal, and an MP3 decoder 544b for decoding the audio signal.

The video encoder 545 is provided in a signal processor

20 540 to convert a digital video signal from the MPEG decoder 544a in the multimedia decoder circuit 544 into an analog video signal. The monitor 600 is connected to the body 500 via a cable 650 to receive the analog video signal from the video encoder 545 in the signal processor 540 and display it

25 on a screen.

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A digital audio signal from the MP3 decoder 544b in the multimedia decoder circuit 544 is converted by the D/A converter 246 into an analog audio signal, which is then amplified by the amplifier 248 and applied to the audio
5  generator 300.

In operation, if the remote controller 100 is operated to select a desired one of a large number of movie files stored on the hard disk drive 215, then the body controller 230 reads the selected movie file from the hard disk drive 215 and
10  transfers it to the signal processor 540. Subsequently, in the signal processor 540, the PLD 242 converts the movie file data from the body controller 230 into a serial digital signal and outputs the converted serial digital signal to the multimedia decoder circuit 544.

15  In the multimedia decoder circuit 544, a digital video signal of the selected movie file from the PLD 242 is decoded by the MPEG decoder 544a and converted by the video encoder 545 into an analog video signal, which is then applied to the monitor 600. As a result, a picture of the selected movie
20  file is displayed on the screen of the monitor 600. On the other hand, a digital audio signal of the selected movie file from the PLD 242 is decoded by the MP3 decoder 544b and converted by the D/A converter 246 into an analog audio signal, which is then amplified by the amplifier 248 and
25  applied to the audio generator 300. As a result, sound of the

selected movie file is outputted through the audio generator 300.

As apparent from the above description, according to the present invention, thousands of MP3 and movie files are downloaded and stored in a hard disk drive installed in a computer and data of the stored MP3 and movie files are selectively outputted to the user. Therefore, the user is capable of readily selecting and listening to or viewing a desired one of the stored MP3 and movie files according to a given condition without frequently replacing recording media. The present digital file reproduction system is thus suitable for use in homes or vehicles.

Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

The following sheets of the description set out the text which should notionally be inserted in the boxes identified by the respective references in Figures 2 and 4 to 7, and set out, in the case of Figure 3, English translations of the Korean text appearing in the top line within area 123 in Figure 3 and in lines 1 to 5 inclusive within that area.

TITLE: DIGITAL FILE REPRODUCTION SYSTEM AND METHOD FOR DRIVING THE SAME

DRAWING

5

Fig. 2

215: hard disk drive

220: interface

205: power supply

10  234: main memory

238: auxiliary memory

236: code memory

249: adjustment unit

244: decoder

15  246: D/A converter

248: amplifier

310: cassette pack, audio

130: sub-controller

110: button pad

20  120: display

Fig. 3

ELVIS PRESLEY

1. HEARTBREAK HOTEL

25  2. I WANT YOU, I NEED YOU, I LOVE YOU

3. HOUND DOG

4. DON'T BE CRUEL

5. LOVE ME TENDER

Fig. 4

Power ON

S11: initialize system and turn off logo music and picture

S12: store music file list

S13: turn off logo music and picture

S14: display music file list

S20: button operated ?

S31: reproduction completed ?

S32: highlight and reproduce next tune

S41: play state (1) ?

S42: play

S43: stop

S50: one second or more ?

S55: output favorite list

S60: one second or more ?

S65: output favorite list

S51: play state (2) ?

S52: stop reproduction

highlight and reproduce previous tune

S61: play state (3) ?

S62: stop reproduction


highlight and reproduce next tune

S53: highlight previous tune

S63: highlight next tune


Fig. 5

S20: button operated ?


to S31


S71: play state (4) ?

S72: stop reproduction


highlight and reproduce first tune in previous folder


S81: play state (5) ?

S82: stop reproduction


highlight and reproduce first tune in next folder


S73: highlight previous folder

S83: highlight next folder

Fig. 6

S20: button operated ?

5   to S31

S91: play state (6) ?

S92: suspend reproduction

S93: suspended ?

10   S94: release suspension

S95: favorite music file ?

S96: release favorite state

S97: register music file in favorite list

15   Fig. 7

S20: button operated ?

to S31

20   S91: play state (6) ?

S92: suspend reproduction

S93: suspended ?

S94: release suspension

S98: ejected ?

25   S99: close tray

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S100: open tray

to S11

5  Fig. 9
   545: video encoder
   600: monitor

CLAIMS

1. A digital file reproduction system comprising:

a body including a hard disk drive for storing a large number of music files compressed in an MP3 manner, a drive receiver having a space defined to receive said hard disk drive and including means for reading a list and data of said music files stored on said hard disk drive, a body controller for reading said music file list stored on said hard disk drive through said drive receiver, storing and outputting the read music file list, selecting a specific one of said music files stored on said hard disk drive in response to a control signal, reading data of the selected music file from said hard disk drive through said drive receiver and storing and outputting the read music file data, a signal processor for expanding said music file data from said body controller and converting the expanded music file data into an analog voltage signal, and a power supply for supplying power to said system;

a remote controller including a display for displaying said music file list stored in said body controller, a button pad for selecting said specific music file in said music file list displayed on said display and instructing said body controller to output the data of the selected music file, and a sub-controller for receiving said music file list stored in said body controller, displaying it on said display,

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highlighting said specific music file selected by said button pad and outputting said control signal to said body controller in response to the instruction from said button pad; and

an audio generator for receiving said analog voltage
5 signal from said signal processor in said body, converting it into an audio signal and outputting the converted audio signal externally.

2. The digital file reproduction system as set forth in
10 Claim 1, wherein said body controller includes:

a code memory for storing a program for operating said body controller;

a main memory for storing said music file list and music file data read from said hard disk drive; and
15 a central processing unit operated according to said program stored in said code memory, for reading said music file list from said hard disk drive through said drive receiver, storing it in said main memory, outputting the stored music file list to said sub-controller, selecting said
20 specific one of said music files stored on said hard disk drive in response to said control signal from said sub-controller, reading the data of the selected music file from said hard disk drive through said drive receiver, storing it in said main memory and outputting the stored music file data
25 to said signal processor.

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3. The digital file reproduction system as set forth in Claim 1 or Claim 2, wherein said signal processor includes:

a programmable logic device for receiving said music file data from said body controller in a microprocessor bus manner and converting it into a serial digital signal;

a multimedia decoder connected to an output terminal of said programmable logic device;

a digital/analog converter connected to an output terminal of said multimedia decoder; and

an amplifier connected to an output terminal of said digital/analog converter.

4. The digital file reproduction system as set forth in Claim 2, wherein said code memory is adapted to store logo music and logo picture data and output the stored logo music and logo picture data respectively to said audio generator and display for a predetermined period of time upon initialization by said remote controller.

5. The digital file reproduction system as set forth in Claim 1, wherein said audio generator includes:

a cassette pack connected to an output terminal of said signal processor in said body, for converting said analog voltage signal from said signal processor into a magnetic signal; and

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an audio set including a cassette driver having a head for sensing said magnetic signal from said cassette pack, said audio set converting said magnetic signal sensed by said head into an audio signal and outputting the converted audio signal
5    externally, said cassette pack being shaped to be inserted into said cassette driver.

6. The digital file reproduction system as set forth in Claim 1, wherein said button pad in said remote controller
10   includes:

a power button for energizing said body controller and remote controller;

up and down buttons, each for selecting one music file in said music file list displayed on said display; and
15      a play/stop button for controlling the output of data of the selected music file from said body.

7. The digital file reproduction system as set forth in Claim 6, wherein said button pad in said remote controller
20   further includes folder up and down buttons, each for scanning said music files stored on said hard disk drive in the unit of folders.

8. The digital file reproduction system as set forth in
25   Claim 6 or Claim 7, wherein said button pad in said remote

controller further includes a pause button for suspending the output of music file data being reproduced.

9. The digital file reproduction system as set forth in Claim 1, wherein said display in said remote controller includes operation display means for providing a character indication of a control state by said button pad.

10. The digital file reproduction system as set forth in Claim 1, wherein said button pad in said remote controller includes:

favorite selection means for selecting user's favorite music files in said music file list displayed on said display; and

favorite list display means for displaying a list of said music files selected by said favorite selection means on said display; and

wherein said body controller in said body includes means for storing the list of said music files selected by said favorite selection means as a favorite list and outputting the stored favorite list to said display under control of said favorite list display means.

11. A digital file reproduction system comprising:
a body including a CD-ROM for storing a large number of

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music files compressed in an MP3 manner, a CD-ROM drive for accommodating said CD-ROM and reading a list and data of said music files stored on said CD-ROM, a body controller for reading said music file list stored on said CD-ROM through said CD-ROM drive, storing and outputting the read music file list, selecting a specific one of said music files stored on said CD-ROM in response to a control signal, reading data of the selected music file from said CD-ROM through said CD-ROM drive and storing and outputting the read music file data, a signal processor for expanding said music file data from said body controller and converting the expanded music file data into an analog voltage signal, and a power supply for supplying power to said system;

a remote controller including a display for displaying said music file list stored in said body controller, a button pad for selecting said specific music file in said music file list displayed on said display and instructing said body controller to output the data of the selected music file, and a sub-controller for receiving said music file list stored in said body controller, displaying it on said display, highlighting said specific music file selected by said button pad and outputting said control signal to said body controller in response to the instruction from said button pad; and

an audio generator for receiving said analog voltage signal from said signal processor in said body, converting it

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into an audio signal and outputting the converted audio signal externally.

12. A digital file reproduction system comprising:

a body including a hard disk drive for storing a large number of movie files compressed in a digital manner, a drive receiver having a space defined to receive said hard disk drive and including means for reading a list and data of said movie files stored on said hard disk drive, a body controller for reading said movie file list stored on said hard disk drive through said drive receiver, storing and outputting the read movie file list, selecting a specific one of said movie files stored on said hard disk drive in response to a control signal, reading data of the selected movie file from said hard disk drive through said drive receiver and storing and outputting the read movie file data, a signal processor for expanding said movie file data from said body controller, separating the expanded movie file data into a video signal and an audio signal and converting the separated video and audio signals respectively into analog video and audio signals, and a power supply for supplying power to said system;

a remote controller including a display for displaying said movie file list stored in said body controller, a button pad for selecting said specific movie file in said movie file

list displayed on said display and instructing said body controller to output the data of the selected movie file, and a sub-controller for receiving said movie file list stored in said body controller, displaying it on said display, highlighting said specific movie file selected by said button pad and outputting said control signal to said body controller in response to the instruction from said button pad;

an audio generator for receiving said analog audio signal from said signal processor in said body and outputting it externally; and

a monitor for receiving said analog video signal from said signal processor in said body and displaying it on a screen.

13. The digital file reproduction system as set forth in Claim 12, wherein said signal processor includes:

a programmable logic device for receiving said movie file data from said body controller in a microprocessor bus manner and converting it into a serial digital signal;

a multimedia decoder connected to an output terminal of said programmable logic device, for separating an output signal from said programmable logic device into a video signal and an audio signal and decoding the separated video and audio signals;

a video encoder connected to an output terminal of said

multimedia decoder, for encoding said video signal from said multimedia decoder and outputting the encoded video signal to said monitor;

a digital/analog converter connected to said output terminal of said multimedia decoder, for converting said audio signal from said multimedia decoder into an analog audio signal; and

an amplifier connected to an output terminal of said digital/analog converter, for amplifying said analog audio signal from said digital/analog converter and outputting the amplified audio signal to said audio generator.

14. The digital file reproduction system as set forth in Claim 13, wherein said multimedia decoder includes:

an MPEG decoder for decoding a video signal of the selected movie file and outputting the decoded video signal to said encoder; and

an MP3 decoder for decoding an audio signal of the selected movie file and outputting the decoded audio signal to said digital/analog converter.

15. A method for driving a digital file reproduction system, comprising the steps of:

a) initializing said system if a power button of a remote controller is operated under the condition that a hard disk

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drive recorded with a large number of music files is installed in a drive receiver;

b) reading a list of said music files recorded on said hard disk drive and storing it in a main memory;

c) outputting said music file list stored in said main memory to said remote controller to display it on a display of said remote controller and highlighting a highest-order music file in said music file list displayed on said display;

d) sensing an operation of a button pad of said remote controller; and

e) selecting and highlighting one music file in said music file list displayed on said display in response to the operation of said button pad sensed at said step d) and outputting data of the selected and highlighted music file through an audio generator.

16. The method as set forth in Claim 15, further comprising the steps of:

f) determining whether the output of music file data being reproduced has been completed, while any operation of said button pad is not sensed at said step d), and returning to said step d) if the output of said music file data being reproduced has not been completed; and

g), if it is determined at said step f) that the output of said music file data being reproduced has been completed,

highlighting a music file of a next tune on said display, reading data of the highlighted music file from said hard disk drive, storing it in said main memory, outputting the stored music file data through said audio generator and then
5  returning to said step d).

17. The method as set forth in Claim 15, wherein said step a) includes the step of a-1) outputting logo music and logo picture data stored in a code memory respectively to said
10 audio generator and display together with the system initialization; and

wherein said method further comprises the step of f) completing the output of said logo music and logo picture data after performing said step b).

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18. The method as set forth in Claim 15, wherein said step e) includes the steps of:

e-1) determining whether the current state is a play state, if it is sensed at said step d) that a play/stop button
20 is operated;

e-2), if it is determined at said step e-1) that the current state is a stop state, reading data of a music file highlighted on said display from said hard disk drive, storing it in said main memory, outputting the stored music file data
25 to a signal processor to output it through said audio

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generator and then returning to said step d);

e-3) if it is determined at said step e-1) that the current state is said play state, stopping the output of music file data being reproduced and then returning to said step d);

e-4) determining whether the current state is said play state, if it is sensed at said step d) that an up button is operated;

e-5) if it is determined at said step e-4) that the current state is said play state, stopping the output of music file data being reproduced, highlighting a music file of a tune preceding a currently reproduced one, reading data of the highlighted music file from said hard disk drive, storing it in said main memory, outputting the stored music file data through said audio generator and then returning to said step d);

e-6) if it is determined at said step e-4) that the current state is not said play state, selecting and highlighting a music file of a tune preceding one currently highlighted on said display and then returning to said step d);

e-7) determining whether the current state is said play state, if it is sensed at said step d) that a down button is operated;

e-8) if it is determined at said step e-7) that the current state is said play state, stopping the output of music

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file data being reproduced, highlighting a music file of a tune following a currently reproduced one, reading data of the highlighted music file from said hard disk drive, storing it in said main memory, outputting the stored music file data

5   through said audio generator and then returning to said step d); and

e-9) if it is determined at said step e-7) that the current state is not said play state, selecting and highlighting a music file of a tune following one currently

10  highlighted on said display and then returning to said step d).


19. The method as set forth in Claim 15 or Claim 18, wherein said step e) includes the steps of:

15      e-10) determining whether the current state is said play state, if it is sensed at said step d) that a folder up button is operated;

e-11), if it is determined at said step e-10) that the current state is said play state, stopping the output of music

20  file data being reproduced, highlighting a first music file in a folder preceding one with a currently reproduced music file on said display, reading data of the highlighted music file from said hard disk drive, storing it in said main memory, outputting the stored music file data through said audio

25  generator and then returning to said step d);

e-12), if it is determined at said step e-10) that the current state is not said play state, highlighting a folder preceding one with a music file currently highlighted on said display and then returning to said step d);

5      e-13) determining whether the current state is said play state, if it is sensed at said step d) that a folder down button is operated;

e-14), if it is determined at said step e-13) that the current state is said play state, stopping the output of music file data being reproduced, highlighting a first music file in a folder following one with a currently reproduced music file on said display, reading data of the highlighted music file from said hard disk drive, storing it in said main memory, outputting the stored music file data through said audio generator and then returning to said step d); and

e-15), if it is determined at said step e-13) that the current state is not said play state, highlighting a folder following one with a music file currently highlighted on said display and then returning to said step d).

20.  A digital file reproduction system substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

21.  A method of operating a digital file reproduction system substantially as hereinbefore described with reference to the accompanying drawings.

22.  Any novel feature or combination of features described herein.

| Application No: | GB 0004875.1 | 5 7 | Examiner: | Rebecca Villis |
|---|---|---|---|---|
| Claims searched: | 1-21 | | Date of search: | 16 August 2000 |

## Patents Act 1977
## Search Report under Section 17

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

    UK Cl (Ed.R): G5R (RAB), (RAC), (RAD), (RGA), (RHD)

    Int Cl (Ed.7): G11B 19/02, 19/16, 31/00

Other:    Online: WPI, EPODOC, PAJ

**Documents considered to be relevant:**

| Category | Identity of document and relevant passage | | Relevant to claims |
|---|---|---|---|
| X,P | GB 2332772 A | (CHOI et al) | 1,6,7,8,11 12,15 |
| X | GB 2310528 A | (READ) | 1,6,7,8,11, 12,15 at least |
| X | EP 0565092 A1 | (TAKAGI) | 1,11,12,15 at least |
| X | JP 07092982 A | (KIKUCHI) | 1,11,12,15 at least |

| X | Document indicating lack of novelty or inventive step | A | Document indicating technological background and/or state of the art. |
|---|---|---|---|
| Y | Document indicating lack of inventive step if combined with one or more other documents of same category. | P | Document published on or after the declared priority date but before the filing date of this invention. |
| & | Member of the same patent family | E | Patent document published on or after, but with priority date earlier than, the filing date of this application. |